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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MONA M. EISSA, MARK R. KIMMICH,
SUDTIDA LAVANGKUL, SOPA CHEVACHAROENKUL, and
MARK L. JENSON

Appeal 2019-003090
Application 15/003,856
Technology Center 2800

Before ROBERT E. NAPPI, JEAN R. HOMERE, and
JAMES R. HUGHES, *Administrative Patent Judges*.

HUGHES, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Claims 1–15 are pending, stand rejected, are appealed by Appellant,¹ and are the subject of our decision under 35 U.S.C. § 134(a). *See* Final Act. 1; Appeal Br. 16–17.² We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

¹ We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as Texas Instruments, Inc. *See* Appeal Br. 2.

² We refer to Appellant’s Specification (“Spec.”), filed Jan. 22, 2016; Appeal Brief (“Appeal Br.”), filed Oct. 12, 2018; and Reply Brief (“Reply Br.”), filed Mar. 8, 2019. We also refer to the Examiner’s Final Office

CLAIMED SUBJECT MATTER

The claimed subject matter generally relates to fluxgate devices and “the fabrication of integrated fluxgate devices.” Spec. ¶ 2. More specifically, Appellant’s claimed subject matter relates to integrated circuits and devices with a magnetic core structure a first “encapsulation layer” surrounding the magnetic core structure, a second encapsulation layer surrounding the first encapsulation layer, the encapsulation layers having different thermal expansion coefficients (thermal expansion characteristics), and an oxide layer formed on top of (above) the second encapsulation layer with a thickness that mitigates thermal stress between the encapsulation layers. See Spec. ¶¶ 2–5; Abstract. Claims 1 (directed to an integrated circuit) and 10 (directed to an integrated fluxgate device) are independent. Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. An integrated circuit, comprising:
 - a substrate;
 - a circuit having transistors with active regions developed on the substrate and a metal layer formed above the active regions to provide interconnections for the transistors;
 - a core structure formed above the metal layer;
 - a first encapsulation layer encapsulating the core structure and having a first thermal expansion coefficient;*
 - a second encapsulation layer encapsulating the first encapsulation layer over the core structure and having a second thermal expansion coefficient different from the first thermal expansion coefficient; and*
 - an oxide layer formed above the second encapsulation layer, the oxide layer having an oxide thickness sufficient to*

Action (“Final Act.”), mailed June 1, 2018; and Answer (“Ans.”) mailed Jan. 10, 2019.

mitigate a thermal stress between, and prevent cracking attributable to the thermal stress in, the first and second encapsulation layers.

Appeal Br. 12 (Claims App.) (emphasis added).

REFERENCES

The prior art relied upon by the Examiner as evidence is:

Name	Reference	Date
Na et al. (“Na”)	US 7,382,123 B2	June 3, 2008
Schatz et al. (“Schatz”)	US 2014/0077796 A1	Mar. 20, 2014
Iuliano et al. (“Iuliano”)	US 2014/0167193 A1	June 19, 2014

REJECTIONS³

1. The Examiner rejects claims 1–9 under 35 U.S.C. § 112(b) as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Appellant regards as the invention. *See* Final Act. 2–3.

2. The Examiner rejects claims 1–8 and 10–15 under 35 U.S.C. § 103 as being unpatentable over Iuliano and Na. *See* Final Act. 3–13.

3. The Examiner rejects claim 9 under 35 U.S.C. § 103 as being unpatentable over Iuliano, Na, and Schatz. *See* Final Act. 12–13.

³ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284 (2011), amended 35 U.S.C. §§ 103 and 112. Because the present application has an effective filing date (Jan. 22, 2016) after the AIA’s effective date, this decision refers to 35 U.S.C. §§ 103 and 112(b).

ANALYSIS

Indefiniteness Rejection of Claims 1–9

The Examiner rejects independent claim 1 and dependent claims 2–9 as being indefinite. *See* Final Act. 2–3; Ans. 3–4. Specifically, the Examiner finds that the oxide thickness limitation—“the oxide layer having an oxide thickness sufficient to mitigate a thermal stress between . . . the first and second encapsulation layers” (Appeal Br. 12 (Claim App.) (claim 1))—is “functional language” (Final Act. 2) and, therefore, the Examiner “is unable to determine the specific structure which performs the claimed function (as well as the degree of mitigation required to satisfy the claim)” (Final Act. 3). *See* Ans. 3–4.

Appellant contends the oxide layer limitation goes beyond simply reciting functional language, in that the claim (claim 1) specifically recites that the “‘oxide layer’ is ‘formed above the second encapsulation layer’” the purported functional properties of the oxide thickness are “well explained in the specification.” Appeal Br. 4; *see* Appeal Br. 4–7; Reply Br. 2–7.

The essence of the requirement under 35 U.S.C. § 112(b), is that the language of the claims must make clear what subject matter the claims encompass—i.e., “whether those skilled in the art would understand what is claimed when the claim is read in light of the specification.” *Star Scientific, Inc. v. R.J. Reynolds Tobacco Co.*, 655 F.3d 1364, 1380 (Fed. Cir. 2011) (quoting *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576 (Fed. Cir. 1986)); *see In re Packard*, 751 F.3d 1307, 1310–14 (Fed. Cir. 2014).

“[W]e apply the approach for assessing indefiniteness approved by the Federal Circuit in *Packard*, i.e., ‘[a] claim is indefinite when it contains

words or phrases whose meaning is unclear.’ Put differently, ‘claims are required to be cast in clear—as opposed to ambiguous, vague, indefinite—terms.’” *In re McAward*, Appeal 2015-006416, 2017 WL 3669566, at *5 (PTAB Aug. 25, 2017) (precedential) (quoting *In re Packard*, 751 F.3d at 1310, 1313–14) (citations omitted).

We find the language of claim 1 (and dependent claims 2–9), when properly construed, would be understood by those skilled in the art, and the language is not unclear. In particular, we disagree with the Examiner that one of ordinary skill in the art could not “determine the specific structure which performs the claimed function” or “the degree of mitigation required to satisfy the claim.” Final Act. 3. As pointed out by Appellant, the Specification provides a description of the oxide layer and the oxide thickness providing the recited functionality. *See* Appeal Br. 4–7 (citing Spec. ¶¶ 19–21, 24–27, 39–42); Reply Br. 2–7. Appellant’s Specification explains that the “minimum thickness . . . of the oxide layer . . . can be based upon a stress ratio of the thermal stress associated with the longitudinal size (L) of the magnetic core structure” (Spec. ¶ 26) or “can be at least 85% of the encapsulation thickness” (Spec. ¶ 27).

The Examiner apparently misconstrues the claim language and does not explain why, in view of Appellant’s Specification, the disputed language would be unclear to one of ordinary skill in the art. In light of our findings and Appellant’s arguments, we find the Examiner fails to sufficiently explain why one of ordinary skill in the art would *not* understand what is claimed by Appellant. Therefore, we do not sustain the Examiner’s indefiniteness rejection of claims 1–9.

Obviousness Rejection of Claims 1–8 and 10–15

The Examiner rejects independent claims 1 and 10 (as well as dependent claims 2–8 and 11–15) over Iuliano and Na. *See* Final Act. 3–13; Ans. 4–8. Appellant contends Iuliano and Na do not teach the disputed limitations of claims 1 and 10. *See* Appeal Br. 8–10; Reply Br. 8–9. Specifically, Appellant contends, with respect to claim 1, that neither Iuliano, nor Na teaches or suggests two distinct encapsulation layers. *See* Appeal Br. 8–9; Reply Br. 8–9. Further, Appellant contends, with respect to claim 10, that Iuliano (cited by the Examiner as teaching two distinct oxide layers (*see* Final Act. 9)) does not teach two oxide layers, but instead only teaches a single oxide layer. *See* Appeal Br. 9–10; Reply Br. 9.

We agree with Appellant that the Examiner-cited portions of Iuliano and Na do not teach or suggest the disputed features of claims 1 and 10. Specifically, with respect to claim 1, neither Iuliano, nor Na describes two distinct encapsulation layers and, with respect to claim 10, Iuliano does not describe two oxide layers. The Examiner misconstrues Appellant’s claims as well as the disclosures of the references.

Appellant’s claim 1 requires two distinct “encapsulation” layers—“a first encapsulation layer encapsulating the core structure” and “a second encapsulation layer encapsulating the first encapsulation layer over the core structure” (Appeal Br. 12 (Claims App.) (claim 1)). Appellant’s Specification does not explicitly define “encapsulation,” an “encapsulation layer,” or “encapsulating,” but explains that “encapsulation layers cover[] a magnetic core” (Spec. ¶ 2; *see* Spec. ¶ 3). Further, Appellant’s Specification describes in detail the structure of the encapsulation layers and how the encapsulation layers are formed—“first encapsulation layer 136 has a

bottom portion [that] serves as a seed layer for developing the magnetic core structure 130” and “a top portion to cover and protect the magnetic core structure 130” (Spec. ¶ 19) and “second encapsulation layer 138 includes a top portion that covers the first encapsulation layer 136” and “a bottom portion on which the first encapsulation layer 136 is formed” (Spec. ¶ 20). See Spec. ¶¶ 19, 20, 34, 37; Figs. 3D—3F. Additionally, as pointed out by Appellant (see Reply Br. 8), “encapsulate” has a well-understood meaning—to “enclose in or as if in a capsule.” Webster’s New World College Dictionary (5th ed. 2011) available at <http://www.yourdictionary.com/encapsulate> (last visited Sept. 14, 2010). This definition is consistent with Appellant’s Specification (*supra*). We broadly but reasonably interpret an encapsulation layer, as recited in claim 1 and detailed in the Specification, to superpose beneath and above. Thus, the recited first encapsulation layer must encase the core structure from beneath and cover the core structure from above. It follows that the second encapsulation layer must encase the first encapsulation layer from beneath and cover the first encapsulation layer from above. The claim requires at least two layers above and two layers beneath the magnetic core structure.

Iuliano describes a first barrier layer (25, 25’) beneath a magnetic layer (27, 27’) and a second barrier layer (29, 29’) above (covering) the magnetic layer. See Iuliano ¶¶ 74, 75, 83; Figs. 10, 14. Iuliano also describes a protective layer (36) covering the second barrier layer. See Iuliano ¶¶ 93, 94, 98; Figs. 14–16. Na describes a first insulating layer (140), an amorphous magnetic core (150), and a second insulating layer (170). See Na col. 5, l. 31–col. 6, l. 59; Figs. 4E–4O. Iuliano’s barrier layers (25 and 29) do not cover or encapsulate the magnetic layer (27) from

above and below, and the second barrier layer does not cover or encapsulate the first from above and below. Similarly, Na's insulating layer (140) covers only the bottom of magnetic core (150) (encloses the core from beneath), and Na's insulating layer (170) covers only the top of magnetic core (150) (encloses the core from above). Neither reference describes two barriers or insulating layers above and two layers below a magnetic core.

With respect to claim 1, the claim requires two encapsulation layers (*supra*). At best Na's first and second insulating layers (140 and 170) together partially cover or encapsulate the core (150). *See* Na Fig. 4O. Apparently, the Examiner interprets Na's combination of layers to encapsulate the core. *See* Final Act. 5; Ans. 4–8. Such an interpretation misconstrues Appellant's claim 1 and Na.

With respect to claim 10, the claim requires two oxide layers (*supra*). At best Iuliano teaches a single protective layer. *See* Iuliano ¶¶ 93, 94, 98; Figs. 14–16. There is no disclosure of layer 36 being an oxide. The Examiner's interpretation of Iuliano's protective layer (36) as comprising multiple layers (*see* Final Act. 9–10; Ans. 9) is not reasonable in view of Iuliano's description of a single protective layer.

Consequently, we are constrained by the record before us to find that the Examiner erred in concluding Iuliano and Na render Appellant's claims 1 and 10 obvious. Claims 2–8 and 11–15 depend from and stand with their respective base claims. Accordingly, Appellant's contentions persuade us of error in the Examiner's obviousness rejection of claims 1–8 and 10–15, and we reverse the Examiner's rejection of these claims.

Obviousness Rejection of Claim 9

The Examiner rejects claim 9 under 35 U.S.C. § 103 as being unpatentable over Iuliano, Na, and Schatz. *See* Final Act. 12–13. The Examiner does not suggest Schatz, alone or in combination with Iuliano and Na, cures the above noted deficiencies of the Iuliano-Na combination (*supra*). Therefore, we reverse the Examiner’s obviousness rejection of dependent claim 9 for the same reasons set forth for claim 1 (*supra*).

CONCLUSION

Appellant has shown that the Examiner erred in rejecting claims 1–9 under 35 U.S.C. § 112(b). Appellant has also shown that the Examiner erred in rejecting claims 1–15 under 35 U.S.C. § 103. We, therefore, do not sustain the Examiner’s rejections of claims 1–15.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/ Basis	Affirmed	Reversed
1–9	112(b)	Indefiniteness		1–9
1–8, 10–15	103	Iuliano, Na		1–8, 10–15
9	103	Iuliano, Na, Schatz		9
Overall Outcome				1–15

REVERSED